

Answer the following problems by **showing ALL work!** (15 pts each)

1. 600.0 mL of oxygen are collected over water at 26.0 °C and a pressure of 760.0 mm of mercury. What is the volume of dry oxygen at 32.0 °C and 700.0 mm pressure?

$$P_1 = 734.8 \text{ mmHg}$$

$$V_1 = 600 \text{ mL}$$

$$T_1 = 299 \text{ K}$$

$$P_2 = 700 \text{ mmHg}$$

$$V_2 = X$$

$$T_2 = 305 \text{ K}$$

$$(734.8)(600) = 700(X)$$

$$299 \text{ K}$$

$$305$$

$$X = 642.5 \text{ mL}$$

2. What is the final volume of a 450.0 mL gas sample that is subjected to a temperature change from 20.0 °C to 37.0 °C and a pressure change from 760.0 mmHg to 380.0 mmHg?

$$P_1 = 760 \text{ mm}$$

$$P_2 = 380$$

$$V_1 = 450 \text{ mL}$$

$$V_2 = X$$

$$T_1 = 293 \text{ K}$$

$$T_2 = 310$$

$$\frac{(760)(450)}{293} = \frac{(380)(X)}{310}$$

$$X = 952.2 \text{ mL}$$

3. At a pressure of 500.0 mmHg and 22°C, a certain gas has a volume of 250.0 mL. What will be the volume of this gas under STP?

$$P_1 = 500.0 \text{ mmHg}$$

$$P_2 = 760 \text{ mmHg}$$

$$V_1 = 250 \text{ mL}$$

$$V_2 = X \text{ mL}$$

$$T_1 = 295 \text{ K}$$

$$T_2 = 273 \text{ K}$$

$$\frac{(500)(250)}{295} = \frac{760(X)}{273}$$

$$X = 152.2 \text{ mL}$$

4. How many moles of gas are contained in 500.0 mL at 37.0 °C and 740.0 mm Hg pressure?

$$(740)(500) = X (62360)(310)$$

$$X = .02 \text{ mol}$$

5. Calculate the molecular weight of a gas if 35.44 g of the gas stored in a 7.50 L tank exerts a pressure of 60.0 atm at a constant temperature of 35.5 °C.

$$(60)(7.50) = \frac{(35.44)(.082)(308.3)}{X}$$

$$X = 1.99 \text{ g/mol}$$

OR

$$X = 2 \text{ g/mol}$$